To Be Scanned
BLD13-00012

Project:

Location: Roof Beam 1
Roof Beam
[2009 International Building Code(2005 NDS)]
5.5 IN x 10.5 IN x 12.0 FT
24F-1.7E Balanced - Stress Class Rated Western Species - Dry Use
Section Adequate By: 26.6%
Controlling Factor: Moment

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DEFLECTIONS Center

Live Load	0.35	IN L/416
Dead Load	0.18	in
Total Load	0.53	IN L/273

Live Load Deflection Criteria: L/240 Total Load Deflection Criteria: L/180

REACTIONS

	A	B
Live Load	4013 lb	4013 lb
Dead Load	2105 lb	2105 lb
Total Load	6118 lb	6118 lb
Bearing Length	2.22 in	2.22 in

BEAM DATA

Span Length	12	ft
Unbraced Length-Top	0	ft
Unbraced Length-Bottom	0	ft
Roof Pitch	4	:12
Roof Duration Factor	1.15	

MATERIAL PROPERTIES

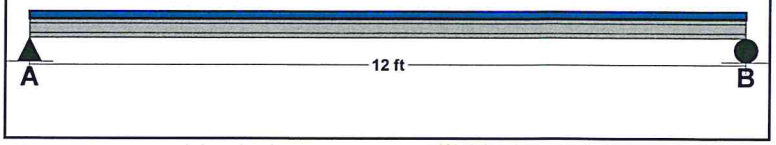
24F-1.7E Balanced - Stress Class Rated Western Species

	Base Values		Adjusted	
Bending Stress:	Fb =	2400 psi	*Controlled by:*	
	Fb_cmpr =	2400 psi	Fb' =	2760 psi
	Cd=1.15			
Shear Stress:	Fv =	210 psi	Fv' =	242 psi
	Cd=1.15			
Modulus of Elasticity:	E =	1700 ksi	E' =	1700 ksi
Min. Mod. of Elasticity:	E_min =	880 ksi	E_min' =	880 ksi
Comp. ⊥ to Grain:	Fc - ⊥ =	500 psi	Fc - ⊥' =	500 psi

Controlling Moment: 18353 ft-lb
6.0 ft from left support
Created by combining all dead and live loads.
Controlling Shear: -6118 lb
At support.
Created by combining all dead and live loads.

Comparisons with required sections:	Req'd	Provided
Section Modulus:	79.8 in3	101.06 in3
Area (Shear):	38 in2	57.75 in2
Moment of Inertia (deflection):	349.74 in4	530.58 in4
Moment:	18353 ft-lb	23244 ft-lb
Shear:	-6118 lb	9298 lb

LOADING DIAGRAM



ROOF LOADING

Side One:			
Roof Live Load:	LL =	25	psf
Roof Dead Load:	DL =	12	psf
Tributary Width:	TW =	23.3	ft
Side Two:			
Roof Live Load:	LL =	25	psf
Roof Dead Load:	DL =	12	psf
Tributary Width:	TW =	3.5	ft
Wall Load:	WALL =	0	plf

SLOPE/PITCH ADJUSTED LENGTHS AND LOADS

Adjusted Beam Length:	Ladj =	12	ft
Beam Self Weight:	BSW =	13	plf
Beam Uniform Live Load:	wL =	669	plf
Beam Uniform Dead Load:	wD_adj =	351	plf
Total Uniform Load:	wT =	1020	plf

Project:

Location: Column 2
Column
[2009 International Building Code(2005 NDS)]
5.5 x 5.5 x 8.0 FT
16F-1.3E Balanced - Stress Class Rated Western Species - Dry Use
Section Adequate By: 75.4%

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VERTICAL REACTIONS

Live Load:	Vert-LL-Rxn =	4134	lb
Dead Load:	Vert-DL-Rxn =	2036	lb
Total Load:	Vert-TL-Rxn =	6170	lb

COLUMN DATA

Total Column Length:	8	ft
Unbraced Length (X-Axis) Lx:	8	ft
Unbraced Length (Y-Axis) Ly:	8	ft
Column End Condtion-K (e):	1	
Axial Load Duration Factor	1.00	

COLUMN PROPERTIES

16F-1.3E Balanced - Stress Class Rated Western Species

	Base Values		Adjusted	
Compressive Stress:	Fc = 925	psi	Fc' = 828	psi
	Cd=1.00 Cp=0.90			
Bending Stress (X-X Axis):	Fbx = 0	psi	Fbx' = 1600	psi
	Cd=1.00			
Bending Stress (Y-Y Axis):	Fby = 800	psi	Fby' = 856	psi
	Cd=1.00 Cf=1.07			
Modulus of Elasticity:	E = 1300	ksi	E' = 1300	ksi
Min. Mod. of Elasticity:	E_min = 670	ksi	E_min' = 670	ksi

Column Section (X-X Axis):	dx =	5.5	in
Column Section (Y-Y Axis):	dy =	5.5	in
Area:	A =	30.25	in2
Section Modulus (X-X Axis):	Sx =	27.73	in3
Section Modulus (Y-Y Axis):	Sy =	27.73	in3
Slenderness Ratio:	Lex/dx =	17.45	
	Ley/dy =	17.45	

Column Calculations (Controlling Case Only):
Controlling Load Case: Axial Total Load Only (L + D)

Actual Compressive Stress:	Fc =	204	psi
Allowable Compressive Stress:	Fc' =	828	psi
Eccentricity Moment (X-X Axis):	Mx-ex =	0	ft-lb
Eccentricity Moment (Y-Y Axis):	My-ey =	0	ft-lb
Moment Due to Lateral Loads (X-X Axis):	Mx =	0	ft-lb
Moment Due to Lateral Loads (Y-Y Axis):	My =	0	ft-lb
Bending Stress Lateral Loads Only (X-X Axis):	Fbx =	0	psi
Allowable Bending Stress (X-X Axis):	Fbx' =	1600	psi
Bending Stress Lateral Loads Only (Y-Y Axis):	Fby =	0	psi
Allowable Bending Stress (Y-Y Axis):	Fby' =	856	psi
Combined Stress Factor:	**CSF =**	**0.25**	

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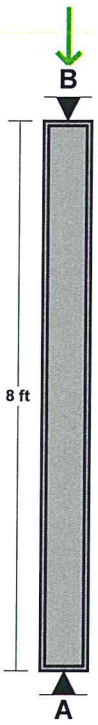

AXIAL LOADING

Live Load:	PL =	4134	lb
Dead Load:	PD =	1984	lb
Column Self Weight:	CSW =	52	lb
Total Load:	PT =	6170	lb

Project:

Location: Footing 3
Footing
[2009 International Building Code(2005 NDS)]
Footing Size: 2.5 FT x 2.5 FT x 10.00 IN
Reinforcement: #4 Bars @ 11.00 IN. O.C. E/W / (3) min.
Section Footing Design Adequate

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FOOTING PROPERTIES

Allowable Soil Bearing Pressure:	Qs = 1500	psf
Concrete Compressive Strength:	F'c = 2500	psi
Reinforcing Steel Yield Strength:	Fy = 60000	psi
Concrete Reinforcement Cover:	c = 3	in

FOOTING SIZE

Width:	W = 2.5	ft
Length:	L = 2.5	ft
Depth:	Depth = 10	in
Effective Depth to Top Layer of Steel:	d = 6.25	in

COLUMN AND BASEPLATE SIZE

Column Type:	Steel	
Column Width:	m = 6	in
Column Depth:	n = 6	in
Baseplate Width:	bsw = 6	in
Baseplate Length:	bsl = 6	in

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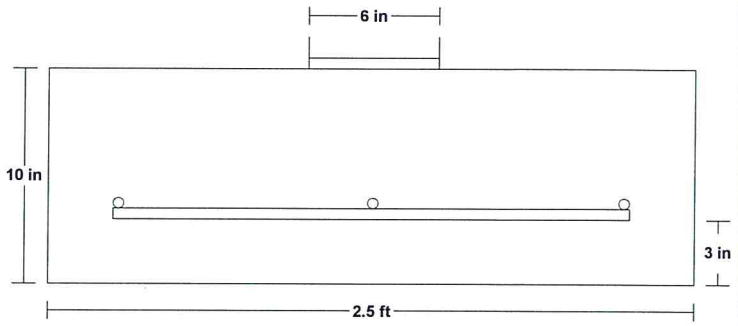

FOOTING CALCULATIONS

Bearing Calculations:

Ultimate Bearing Pressure:	Qu =	990	psf
Effective Allowable Soil Bearing Pressure:	Qe =	1375	psf
Required Footing Area:	Areq =	4.5	sf
Area Provided:	A =	6.25	sf
Baseplate Bearing:			
Bearing Required:	Bear =	8250	lb
Allowable Bearing:	Bear-A =	99450	lb
Beam Shear Calculations (One Way Shear):			
Beam Shear:	Vu1 =	1581	lb
Allowable Beam Shear:	Vc1 =	14063	lb
Punching Shear Calculations (Two Way Shear):			
Critical Perimeter:	Bo =	49	in
Punching Shear:	Vu2 =	6875	lb
Allowable Punching Shear (ACI 11-35):	vc2-a =	68906	lb
Allowable Punching Shear (ACI 11-36):	vc2-b =	81563	lb
Allowable Punching Shear (ACI 11-37):	vc2-c =	45938	lb
Controlling Allowable Punching Shear:	vc2 =	45938	lb
Bending Calculations:			
Factored Moment:	Mu =	19801	in-lb
Nominal Moment Strength:	Mn =	189895	in-lb
Reinforcement Calculations:			
Concrete Compressive Block Depth:	a =	0.55	in
Steel Required Based on Moment:	As(1) =	0.06	in2
Min. Code Req'd Reinf. Shrink./Temp. (ACI-10.5.4):	As(2) =	0.54	in2
Controlling Reinforcing Steel:	As-reqd =	0.54	in2
Selected Reinforcement:	#4's @ 11.0 in. o.c. e/w (3) Min.		
Reinforcement Area Provided:	As =	0.59	in2
Development Length Calculations:			
Development Length Required:	Ld =	15	in
Development Length Supplied:	Ld-sup =	9	in

Note: Plain concrete adequate for bending, therefore adequate development length not required.

FOOTING LOADING

Live Load:	PL = 2056	lb
Dead Load:	PD = 4134	lb
Total Load:	PT = 6190	lb
Ultimate Factored Load:	Pu = 8250	lb
Weight to resist uplift w/ 1.5 F.S.:	U.R. = 503	lb